

Appl. No. 10/708,331
Amdt. dated December 13, 2005
Reply to Office action of September 14, 2005

REMARKS/ARGUMENTS

1. *The following title is suggested: DIRECT BACK LIGHT UNIT WITH HEAT EXCHANGE"*

5 **Response:**

The title is amended as the suggestion from the examiner. No new matter is entered. Consideration of this amendment is politely requested.

2. *Claims 1 and 8 are rejected under 35 U.S.C. 102(b) as being anticipated*
10 *by USPN 5,993, 027 to Yamamoto et al.*

Response:

Claim 1 recites a back light unit comprising a light source generator positioned in a backside of a display panel for providing light beams to the
15 display panel, a diffuser positioned between the light source generator for uniformly scattering light beams from the light source generator to the display panel, and a housing enclosing the light source generator and connecting to the diffuser for reflecting the light beams to the diffuser. And the housing further comprises a heat pipe for being a heat transfer
20 interface between the back light unit and an external environment.

According to Fig 1 and col.2, line 51 to col.3, line 21 of Yamamoto, a surface light source device 0 is provided. The surface light source device 0 has a housing 1 partitioned into a closed space (lamp housing) 8 and an
25 open space 9 by an interposed reflective plate 3. The closed space 8, in front of the open space 9, is used for positioning a plurality of lamps 4 as a light source. The special feature of Yamamoto is the heat-radiating portions

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formed in the side portions 7 of the housing 1. The heat-radiating portions include a plurality of openings 7a and 7b for conductively connecting the open space 9, and introduce cooling air supplied outside by an air-cooling fan or the like into the open space to diffuse heat 5 accumulated within the housing 1 (col.3, lines 15-21). In the example shown in Fig 1, the cooling air introduced from one opening 7a moves within the open space 9 along the back surface of the reflective plate 3, and is fed out through the other opening 7b. Yamamoto's teaching is substantially similar to the applicant admitted prior art (AAPA), which 10 teaches setting a plurality of small holes/openings on the housing of the back light unit to serve as vent holes, and setting a fan outside the vent holes. Therefore those skilled in the art will easily realize that Yamamoto's teaching also suffers from the disadvantages such as dust introduced into the back light unit through the openings and the increased radiating area or 15 volume for improving the heat dissipation (paragraph [0007]).

Yamamoto has never taught forming any heat pipe in the housing for being a heat transfer interface in the housing of the back light unit. Therefore the applicant asserts that the heat dissipation theory and the 20 structure of the back light unit provided by Yamamoto are distinctly different from the present application. Reconsideration of claim 1 is politely requested.

In addition, claim 8 is dependent on claim 1 and should be allowed if 25 claim 1 is allowed.

3. Claims 1-4, 6, and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 2003/0039113 to Murr et al in view of USPN

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6,089,739 to Yamamoto et al.

Response:

5 Regarding to claim 1, which recites a back light unit comprising a light source generator positioned in a backside of a display panel for providing light beams to the display panel, a diffuser positioned between the light source generator for uniformly scattering light beams from the light source generator to the display panel, and a housing enclosing the
10 light source generator and connecting to the diffuser for reflecting the light beams to the diffuser. And the housing further comprises a heat pipe for being a heat transfer interface between the back light unit and an external environment.

15 Murr discloses a lighting unit comprising a light-guiding plate 1. According to paragraphs [0024] and [0029], a main side of the light guiding plate 1 forms the light-emitting surface 3 of the light unit. On the other side of the light-guiding plate 1, facing away from the main side, the light-guiding plate 1 is provided with recesses, here in the form of parallel
20 channels 4, in which fluorescent tubes 5 are embedded as light source. The lighting unit further comprises a light box 7 having a base plate 6 and used to receive the light-guiding plate 1 with the fluorescent tubes 5 embedded therein. And a light-reflecting surface 10 is formed in the interior surface 8 of the light box 7. Due to a distance "d" between the fluorescent tubes 5 and the base plate 6, there is a temperature difference created between the tubes 5 and base plate 6, which enhances the elimination of heat.
25 Dissipation via base plate 6 of the heat generated by the fluorescent tubes 5 can be enhanced by a heat sink 9 arranged on the back thereof.

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Overheating of the fluorescent tubes 5 is prevented because the heat generated by the tubes is dissipated via base plate 6 of light box 7. Furthermore, it is well known that the heat sink 9 is formed of a plurality of metal fans, which increase the dissipating area and improve 5 the dissipation. However, the heat sink 9 provided by Murr is too big to be formed inside the light box 7, as shown in Fig. 1. Accordingly, the heat sink 9 cannot be positioned at the light box 7 and is not the same as the heat pipe claimed in claim 1 of this application.

10 It is obvious that Murr does not teach the housing comprising heat pipe for being heat transfer interface. The applicant would like to point out that the difference between Murr and the present application is not only in the structure of the housing, but also in the dissipation theory. Therefore 15 the applicant asserts that the combination of Murr's lighting unit providing a diffuser between the light source generator and the display as taught by Yamamoto is still different from the present application. Reconsideration of claim 1 is politely requested.

20 Claim 2 recites the heat pipe is composed of metal materials. Comparing with the present application, Murr only discloses the interior surface 8 of light box 7 adjacent to the narrow surfaces of the light-guiding plate 1 are metallized (paragraph [0024]) but not teaches the forming of the heat pipe composed of metal materials. Therefore claim 2 is patentably different from Murr. Reconsideration of claim 2 is respectfully requested.

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Claim 3 recites the material of the heat pipe is selected from copper, alumna, tin, or an alloy of any of the above metal materials. Comparing with the present application, Murr discloses that the light box 7 can be

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made, for example, of sheet steel (paragraph [0024]). However, Murr did not teach the forming of the heat pipe. Therefore claim 3 is patentably different from Murr. Reconsideration of claim 3 is respectfully requested.

5 Claim 4 recites the heat pipe is a solid heat-conductive pipe. As mentioned above, Murr only teaches the light box 7 with heat sink 9 arranged on the back thereof for enhancing the dissipation, but never teaches the forming of the heat pipe. Therefore claim 4 is patentably different from Murr. Reconsideration of claim 4 is respectfully requested.

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Claim 6 recites the heat pipe is connected to an external environment through a radiator piece for transferring heat to the external environment effectively. As mentioned above, Murr does not teach forming a heat pipe in the light box 7, nor a radiator piece connecting to the heat pipe.
15 Furthermore, Murr's dissipation is achieved through the base plate 6. Therefore claim 6 is patentably different from Murr. Reconsideration of claim 6 is respectfully requested.

20 Claim 9 recites the surface of the heat pipe is positioned directly below the fluorescent tube, and a surface of the heat pipe contains a radiative reflective layer for reflecting light beams from the fluorescent tube. Murr teaches a light box 7 used to receive the lighting-guiding plate 1 with the fluorescent tubes 5 with a light-reflecting surface 10. However, Murr does not teach the forming of the heat pipe with the radiative reflective layer. Therefore claim 9 is patentably different from Murr.
25 Reconsideration of claim 9 is respectfully requested.

4. *Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over*

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US 2003/0039113 to Murr et al. in view of USPN 6,089,739 to Yamamoto et al. as applied to claim 1 above, and further in view of US 2005/0007755 A1 to Yu et al.

5 **Response:**

Claim 12 recites the back light unit further comprising a diffusion sheet or a prism positioned on the diffuser for increasing the utility of the light resource generator.

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Yu discloses a direct type backlight module 30 including a reflector 32, a diffuser plate 33, lamps 34, and a light-distributing device 35 to optimize the light uniformity. As mentioned above, Yamamoto teaches heat-radiating portions include a plurality of openings 7a and 7b for conductively connecting the open space 9, and introduce cooling air supplied outside by an air-cooling fan or the like into the open space 9 to diffuse heat accumulated within the housing 1, and Murr teaches the base plate 6 and heat sinks 9 used for dissipation. Neither Yamamoto nor Murr teaches the forming of the heat pipe. Therefore modification of Murr in the view of 15 Yamamoto and Yu is still different from the present application. Reconsideration of claim 12 is politely requested.

5. Allowable Subject Matter

25 *Claims 5, 7, 10 and 11 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitation of the base claim and any intervening claims.*

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Response:

Claims 7 and 12 are amended to delete unnecessary words which are
5 function descriptions and are not meaningful in the original structure
claims. No new matter is introduced. As dependent claims 5, 7, 10 and 12
are dependent on claim 1, it should be allowed if claim 1 is allowed in the
light of the explanation above.

10 *6. New claims*

New claims 13-20 are presented and claim 13 and claim 19 are the
independent claim. No new matter is entered by these claims. Yamamoto
and Murr do not teach or suggest back light unit comprising a light source
15 generator, a diffuser, a housing enclosing the light source generator and
connecting to the diffuser for reflecting the light beams to the diffuser, the
housing further comprising a heat pipe having a substantially arc surface or
a rough surface for being a heat transfer interface between the back light
unit and an external environment. Consideration of new claims 13-20 is
20 politely requested.

Applicant respectfully requests that a timely Notice of Allowance be
issued in this case.

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Sincerely yours,

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